FINANCIAL DEPRESSION AND THE PROFITABILITY OF THE BANKING SECTOR OF THE REPUBLIC OF KOREA: PANEL EVIDENCE ON BANK-SPECIFIC AND MACROECONOMIC DETERMINANTS

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The paper provides new empirical evidence on factors that determine the profitability of the banking sector of the Republic of Korea. The empirical findings indicate that the banks of the Republic of Korea with high capitalization levels tend to have higher profitability levels. However, the impact of credit is consistently negative under both controlled and uncontrolled macroeconomic and financial conditions. Meanwhile, the effect of the business cycle towards the profitability of banks are mixed. On the one hand, inflation displays a pro-cyclical impact, while gross domestic product (GDP) has a counter-cyclical influence on the banks' profitability. The findings also indicate that the industry concentration of the national banking system has a positive as well as a significant effect on the banks. The study is based on data from the period 1994-2008. This period is broken down into 4 sub-periods, the tranquil period before the Asian financial crisis (1994-1996), the Asian financial crisis (1997-1998), the tranquil period between the Asian financial crisis and recent global financial crisis (1999-2008) and recent global crisis (2008). The impacts of both the Asian financial crisis and the recent global financial crisis are negative, while the banks have been relatively more profitable during both the tranquil periods.

JEL Classification: G21.

Key words: Banks, profitability, financial depression, Republic of Korea.

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I. INTRODUCTION

Major structural changes have occurred in the banking sector of the Republic of Korea following the Asian financial crisis in 1997, when the country suffered severe economic damage. The transformation is the result of a comprehensive financial reform programme agreed upon by the Government of the Republic of Korea and the International Monetary Fund (IMF). Under the reform programme, for example, five commercial banks were liquidated, with their assets and liabilities were transferred to stronger banks under a purchase and assumption (P&A) arrangement. This came on the heels of an evaluation conducted by the Financial and Supervisory Commission (FSC), which found them to be unviable. In other cases, Commercial Bank and Hanil Bank, were conditionally approved for restructuring by the FSC and then merged into one bank, and Korea First Bank and Seoul Bank, both declared insolvent, were recapitalized by the Government and later sold to foreign banks.

Since the Asian financial crisis, corporate governance in the country's banking sector has also improved dramatically and various financial deregulation measures have been introduced. The ownership and governance structure of commercial banks has been changed extensively by a series of amendments to the Banking Act.[1] In addition, new standards have been implemented to better protect shareholders' rights. The limit of a 4 per cent corporate ownership ceiling for foreign investors has been lifted and most of the regulations concerning foreign banks have been abolished.[2]

Yet, a decade after the Asian financial crisis, the banking sector of the Republic of Korea is currently under threat of escalating into a deeper crisis. The global financial turmoil, which started in mid-2008, is posing serious challenges to the export-driven economy. If the crisis is not managed well, the problem could worsen and the economy of the Republic of Korea could succumb into a much more serious crisis than what it experienced during the Asian financial crisis.

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[1] The Banking Act (Republic of Korea) was enacted on 5 May 1950, as Act No. 911, in order to contribute to the stability of the financial markets and the development of the national economy by ensuring the sound operation of banks: by elevating the efficiency of their financial intermediary functions; by protecting the depositors; and by maintaining orderly credit transactions. Following the Asian financial crisis, the Act was amended three times during 1998-1999. Interested readers can get detailed information on the Banking Act from http://www.moleg.go.kr/english/.

[2] One of the notable changes in financial market of the Republic of Korea in recent years is the increasing ownership by foreign investors. The share of total market capitalization of foreigners' shareholdings has steadily risen and totalled more than 40 per cent in January 2004. In addition to the above examples, Kookmin Bank is a 74 per cent foreign-held bank.

It is reasonable to assume that these developments are posing significant challenges to the financial institutions in the Republic of Korea as the rapid transformation of the sector has affected the determinants of their profitability. This relates to comments by Golin (2001), who points out that in a competitive environment, banks must make adequate earnings in order to remain solvent, survive, grow, and prosper.

As the banking sector is the backbone of the economy of the Republic of Korea, and plays an important financial intermediary role, its health is very critical to the overall health of the economy. Given the relationship between the well-being of the banking sector and the growth of the economy (Rajan and Zingales, 1998; Levine, 1998; Levine and Zervos, 1998; Cetorelli and Gambera, 2001; Beck and Levine, 2004), knowledge of the underlying factors that influence the banking sector's profitability is therefore essential not only for bank managers but for the numerous stakeholders, such as the central banks, bankers associations, government agencies, and other financial authorities. Familiarity with these factors would also serve as an useful tool for regulatory authorities and bank managers when formulating policies aimed at improving the profitability of the country's banking sector.

By using an unbalanced bank level panel data,[3] this study seeks to examine the determinants of profitability for banks of the Republic of Korea during the period 1994-2008, which is characterized as a time of significant reform amid a plethora of challenges to the country's financial sector. While there has been extensive literature examining the profitability of financial sectors in developed countries, empirical studies on factors that influence the performance of financial institutions in developing economies are relatively scarce.

This paper is structured as follows. The next section reviews the related studies. The following section outlines the econometric framework. Section IV reports the empirical findings. Finally, section V concludes the paper and offers avenues for future research.

II. RELATED STUDIES

The empirical literature on bank profitability has mainly focused on the banking system of the United States of America (Berger, 1995; Angbazo, 1997;

[3] During the period under study, some of the banks that existed at the start of the study became insolvent prior the end date of the study period. Instead of removing the observations of these banks, we have included them in the analysis whenever possible, such as until the last year these banks existed before they failed or merged.

DeYoung and Rice, 2004; Stiroh and Rumble, 2006; Hirtle and Stiroh, 2007) and the banking systems of other developed countries such as New Zealand (To and Tripe, 2002), Australia (Williams, 2003) and Greece (Pasiouras and Kosmidou, 2007; Kosmidou and others, 2007; Athanasoglou and others, 2008; Kosmidou and Zopounidis, 2008).

In contrast, there have been only a limited number of studies on bank profitability in developing economies. Guru and others (2002), for example, have investigated the determinants of bank profitability in Malaysia, based on a sample of 17 commercial banks during the period 1986-1995. The profitability determinants are divided into two main categories, namely the internal determinants, liquidity, capital adequacy, and expenses management, and the external determinants, ownership, firm size, and economic conditions. The findings show that efficient management of expenses is a significant factor behind high bank profitability. The results also indicate that among macro indicators, a high interest ratio is associated with low bank profitability and inflation has a positive effect on bank performance.

In another study, Chantapong (2005) investigates the performance of domestic and foreign banks in Thailand during the period 1995-2000. The results show that the banks, both domestic and foreign, reduced their credit exposure during the crisis years and have gradually improved their profitability during the post-crisis years. The results also indicate that the average profitability of the foreign banks is higher than the average profitability of the domestic banks. However, of note, during the post-crisis period, the gap between foreign and domestic bank profitability has narrowed, suggesting that the financial restructuring programme[4] has yielded some positive results.

Meanwhile, Ben Naceur and Goaied (2008) have examined the impact of bank characteristics, financial structure and macroeconomic conditions on the net-interest margins and profitability of Tunisian banks during the period 1980-2000. Their results suggest that banks with a relatively high amount of capital and higher overhead expenses tend to have higher net-interest margins and profitability levels, while size is negatively related to bank profitability. During the period under study, they have found that stock market development has had a positive impact on bank profitability. The empirical findings also suggest that private banks are relatively

[4] The restructuring programme involved two main strategies. In the first strategy, several ailing financial institutions were nationalized or merged with other Thai commercial banks or acquired by foreign banks. In the second strategy, the banking sector was re-capitalized by relaxing regulations on foreign shareholding limits of Thai commercial banks. Thai authorities allowed foreign investors to hold more than 49 per cent of the shares in Thai banking markets for up to ten years, as against the 25 per cent foreign shareholding limit before the Asian financial crisis.

more profitable than their state-owned counterparts, and that macroeconomic conditions have had an impact on the profitability of Tunisian banks.

In a working paper, Ben Naceur and Omran (2008) analyse the influence of bank regulations, concentration of bank assets, and financial and institutional development on Middle East and North Africa (MENA) countries commercial banks margin and profitability during the period 1989-2005. The paper finds that bank-specific characteristics, in particular capitalization and credit risk, have positive effects on the net interest margin, cost efficiency and profitability of banks. On the other hand, the paper indicates that macroeconomic and financial development indicators have no significant impact on bank performance.

More recently, Sufian and Habibullah (2009) investigated the determinants of the profitability of the Chinese banking sector during the post-reform period of 2000–2005.[5] They found that liquidity, credit risk and capitalization positively affected the profitability of state-owned commercial banks, while the impact of overhead costs had negative effects on the banks' results. As for commercial banks, their research indicated that joint stock commercial banks with higher credit risk tended to be more profitable, while higher costs cut into the profits of lower joint stock commercial banks. Size and higher costs were also found to be factors behind the lower profit levels of city commercial banks that were not well capitalized, while on the other hand, the more diversified and relatively better capitalized city commercial banks were found to have exhibited higher profitability levels. The researchers' findings also indicate that the impact of economic growth was positive, while growth in money supply was negatively related to the state-owned commercial banks and city commercial banks' profitability levels.

III. DATA AND METHODOLOGY

The bank-specific variables used in this paper are from the financial statements of a sample of commercial banks operating in the Republic of Korea during the period 1994-2008 available in the Bankscope database of Bureau van Dijk. The macroeconomic variables are from the International Financial Statistics (IFS) database of the International Monetary Fund (IMF). Due to the consolidation

[5] The China banking sector has undergone a series of financial sector reforms. The first wave of reforms was in 1979 with the establishment of a two-tier banking system. The system comprised primarily a central bank and four specialized banks that are owned fully by the central government. The second wave of financial reform launched in 1994 involves commercialization of specialized banks, the separation between policy and commercial lending activities and management of non-performing loans.

and exit of banks during the past decade, the number of commercial banks in the sample vary from 35 in 1994 to 17 in 2008, totalling 369 bank year observations.[6]

Performance measure

In the study, bank profitability, typically measured by the return on assets (ROA) and/or the return on equity (ROE), is usually expressed as a function of internal and external determinants. Internal determinants are factors that are mainly influenced by the management decisions and policy objectives of a bank. Such profitability determinants are the level of liquidity, provisioning policy, capital adequacy, expenses management and bank size. On the other hand, the external determinants, both industry- and macroeconomic-related, are variables that reflect the economic and legal environments where the financial institution operates.

Following Sufian and Habibullah (2009), Ben Naceur and Goaied (2008), and Kosmidou (2008) among others, ROA is the dependent variable used in the study. This variable shows the profit earned per dollar of assets and most importantly reflects management's ability to utilize the financial and real investment resources of the bank to generate profits (Hassan and Bashir, 2003). For any bank, ROA depends on the bank's policy decisions as well as uncontrollable factors relating to the economy and government regulations. Rivard and Thomas (1997) suggest that bank profitability is best measured by ROA given that this indicator is not distorted by high equity multipliers, and represents a better measure of the ability of the firm to generate returns on its portfolio of assets. ROE, on the other hand, reflects how effectively the management of a bank is utilizing its shareholders' funds. Since ROA tends to be lower for financial intermediaries, most banks utilize financial leverage heavily to increase ROE to competitive levels (Hassan and Bashir, 2003).

Internal determinants

The bank-specific variables included in the regression models are LNTA (log of total assets), LOANS/TA (total loans divided by total assets), LLP/TL (loans loss provisions divided by total loans), NII/TA (non-interest income divided by total assets), NIE/TA (total overhead expenses divided by total assets), LNDEPO (log of total deposits) and EQASS (book value of stockholders' equity as a fraction of total assets).

[6] The total number of observations which are available for each bank in terms of years. For example, Bank A has observations for years 1994, 1995, 1996, and 1997 only. So, the total number of bank-year observations is 4. On the other hand, Bank B has observations for the whole sample period, giving it a total of 15. In sum, the total number of bank year observations for. Bank A + Bank B is 4 + 15 = 19.

The LNTA variable is included in the regression as a proxy of size. It is used to capture the possible cost advantages associated with size (economies of scale). A positive relationship between size and bank profitability can be expected if there are significant economies of scale (Akhavein and others, 1997; Bourke, 1989; Molyneux and Thornton, 1992; Bikker and Hu, 2002; Goddard and others, 2004). However, other researchers have found that only marginal cost savings can be achieved by increasing the size of the banking firm (Berger and others, 1987; Boyd and Runkle, 1993; Miller and Noulas, 1997; Athanasoglou and others, 2008). In essence, the impact of size on bank performance remains inconclusive.

Liquidity risk, arising from the possible inability of banks to accommodate decreases in liabilities or to fund increases on the asset side of the balance sheet, is considered an important determinant of bank profitability. The loan market, especially credit to households and firms, is risky, and has a greater expected return than other bank assets, such as government securities. Thus, there is generally a positive relationship between liquidity (LOANS/TA) and profitability (Bourke, 1989). However, in some cases, higher profits are expected if less funds are tied up in liquid investments (Eichengreen and Gibson, 2001).[7]

The ratio of loan loss provisions to total loans (LLP/TL) is incorporated as an independent variable in the regression analysis as a proxy of credit risk. The coefficient of LLP/TL is expected to be negative because bad loans generally reduce profitability. In this direction, Miller and Noulas (1997) suggest for financial institutions, greater exposure in high risk loans leads to a higher accumulation of unpaid loans and consequently, lower profitability. Miller and Noulas (1997) also indicate that declines in loan loss provisions are in many instances the primary catalyst for increases in profit margins. Furthermore, Thakor (1987) suggests that a bank's level of loan loss provisions is an indication of its asset quality and signals changes in the future performance.

To recognize that financial institutions in recent years have increasingly been generating income from "off-balance sheet" business, particularly income from stock market trading and derivative financial instruments, and fee income, such as service charges and guarantee fees, the ratio of non-interest income over total assets (NII/TA) is entered in the regression analysis. Non-interest income consists of commissions, service charges and fees, guarantee fees, net profit from sale of investment securities and foreign exchange profit. The ratio is also included in the regression model as a proxy measure of bank diversification into non-traditional

[7] Although a higher loan to total assets ratio implies higher interest revenue because of the higher risk, bank loans have high operational costs because they need to be originated, serviced, and monitored.

activities. The variable is expected to exhibit a positive relationship with bank profitability.

The ratio of overhead expenses to total assets (NIE/TA) is used to provide information on the variations of bank operating costs. The variable represents the total amount of wages and salaries, as well as the costs of running branch office facilities. For the most part, the paper argues that reduced expenses improve the efficiency of an operation and hence, raises the profitability of a financial institution, implying a negative relationship between the operating expenses ratio and profitability (Bourke, 1989). However, Molyneux and Thornton (1992) observes a positive relationship, suggesting that high profits earned by firms may be appropriated in the form of higher payroll expenditures paid to more productive human capital.

The variable LNDEPO is included in the regression model as a proxy variable for network embeddedness. For the most part, banks with large branch networks are able to attract more deposits, a relatively cheap source of funds. Earlier studies, by among others Chu and Lim (1998), point out that large banks tend to attract more deposits and loan transactions, and in the process command larger interest rate spreads, while the smaller banking groups generally have smaller deposits and need to resort to purchasing funds in the inter-bank market, which is costlier (Lim and Randhawa, 2005). However, Lim and Randhawa (2005) also suggest that due to their small deposit bases, small banks have less deposits to transform into loans, giving them higher efficiency levels compared to their larger counterparts.

EQASS is included in the regressions to examine the relationship between profitability and bank capitalization. Even though leverage (capitalization) is deemed to be important in explaining the performance of financial institutions, its impact on bank profitability is ambiguous. As lower capital ratios suggest a relatively risky position, a negative coefficient on this variable seems plausible (Berger, 1995). However, it could be the case that higher levels of equity would decrease the cost of capital, leading to a positive impact on bank profitability (Molyneux, 1993). Moreover, an increase in capital may raise expected earnings by reducing the expected costs of financial distress, including bankruptcy (Berger, 1995).

External determinants

Bank profitability is sensitive to macroeconomic conditions despite the industry trend towards greater geographic diversification and larger use of financial engineering techniques to manage risk associated with business cycle forecasting. Generally, higher economic growth encourages banks to lend more and permits them to charge higher margins. It also improves the quality of banks' assets. Neely and Wheelock (1997) use per capita income and suggest that this variable exerts

a strong positive effect on bank earnings. Demirgüç-Kunt and Huizinga (2001) and Bikker and Hu (2002) identify possible cyclical movements in bank profitability, to the extent to which bank profits are correlated with the business cycle. Their findings suggest that this correlation exists, although the variables used are not direct measures of the business cycle.

To measure the relationship between economic and market conditions and bank profitability, LNGDP (natural log of GDP), INFL (the rate of inflation), CR3 (the ratio of the three largest banks' assets), MKTCAP (the ratio of the stock market capitalization over GDP), DUMTRAN1 (dummy variable that takes a value of 1 for the first tranquil (pre-crisis) period, 0 otherwise), DUMCRIS (dummy variable that takes a value of 1 for the crisis period, 0 otherwise), and DUMTRAN2 (dummy variable that takes a value of 1 for the second tranquil (post-crisis) period, 0 otherwise) are used.

GDP is among the most commonly used macroeconomic indicators to measure total economic activity within an economy. The GDP of an economy is expected to influence numerous factors related to the supply and demand for loans and deposits. Favourable economic conditions also positively affect the demand and supply of banking services. Another important macroeconomic condition, which may affect both the costs and revenues of banks is the inflation rate (INFL). Staikouras and Wood (2003) point out that inflation may have direct effects (e.g. increase in the price of labour) and indirect effects (e.g. changes in interest rates and asset prices on the profitability of banks) on the operations of a bank. Perry (1992) suggests that the effects of inflation on a bank's performance depend on how accurately the inflation is projected. If the projection is accurate, interest rates are adjusted accordingly, enabling revenues to increase faster than costs, which subsequently have a positive impact on bank profitability. On the other hand, if the projection is off the mark, banks may be slow in adjusting their interest rates, resulting in bank costs increasing faster than bank revenues and ultimately cutting into profitability. Earlier studies by Bourke (1989), Molyneux and Thornton (1992) and, Demirgüç-Kunt and Huizinga (1999), among others, have found a positive relationship between inflation and bank performance.

The CR3 variable measured as the concentration ratio of the three largest banks in terms of assets is entered in the regression models as a proxy variable for the banking sector concentration. According to the industrial organization literature, a positive impact is expected under both views (i.e. the collusion and the efficiency views) (Goddard and others, 2001).[8]

[8] Interested readers can refer to an excellent book by Bikker and Bos (2008) for detailed discussions.

MKTCAP is introduced in the regression model to reflect the complementarity or substitutability between bank and stock market financing. Demirgüç-Kunt and Huizinga (1999) have found that stock market capitalization to bank assets is negatively related to bank margins and suggest that relatively well developed stock markets can serve as an alternative to banks for obtaining funds. This variable is expected to be negatively related to bank performance.

To capture the impact of the Asian financial crisis and the recent global financial crisis on the profitability of the banking sector of the Republic of Korea, DUMTRAN1, DUMCRIS, DUMTRAN2, and DUMCRIS2 are introduced in regression models 3, 4, 5, and 6, respectively. The banking sector of the Republic of Korea, has exhibited higher profitability levels during both the tranquil periods (i.e. DUMTRAN1 and DUMTRAN2), while DUMCRIS and DUMCRIS2 are expected to exhibit a negative relationship with the profitability of the banks of the Republic of Korea.

Table 1 lists the variables used to proxy profitability and its determinants. It also includes the notation and the expected effect of the determinants according to the literature.

Table 1. Description of the variables used in the regression models

Variable	Description	Hypothesized relationship with profitability
Dependent		
ROA	The return on average total assets of bank *j* in year *t*.	NA
Independent		
	Internal Factors	
LNTA	The natural logarithm of the accounting value of the total assets of bank *j* in year *t*.	+/-
LOANS/TA	A measure of liquidity, calculated as total loans/ total assets. The ratio indicates what percentage of the assets of the bank is tied up in loans in year *t*.	+
LLP/TL	Loan loss provisions/total loans. An indicator of credit risk, which shows how much a bank is provisioning in year *t* relative to its total loans.	-
NII/TA	A measure of diversification and business mix, calculated as non-interest income/total assets of bank *j* in year *t*.	+

Table 1. *(continued)*

Variable	Description	Hypothesized relationship with profitability
NIE/TA	Calculated as non-interest expense/total assets and provides information on the efficiency of the management regarding expenses relative to the assets in year *t*. Higher ratios imply a less efficient management.	-
LNDEPO	LNDEPO is a proxy measure of network embeddedness, calculated as the log of total deposits of bank *j* in year *t*.	+/-
EQASS	A measure of bank *j*'s capital strength in year *t*, calculated as equity/total assets. High capital asset ratio is assumed to be indicator of low leverage and therefore lower risk.	+
	External factors	
LNGDP	Natural logarithm of gross domestic products.	+/-
ΔGDP	The change real in gross domestic products.	+/-
INFL	The annual inflation rate.	+/-
CR3	The three largest banks asset concentration ratio.	+/-
MKTCAP	The ratio of stock market capitalization. The variable serves as a proxy of financial development.	-
DUMTRAN1	Dummy variable that takes a value of 1 for the first tranquil (pre crisis) period, 0 otherwise.	+
DUMCRIS	Dummy variable that takes a value of 1 for the first crisis period (i.e. 1997-1998), 0 otherwise.	-
DUMTRAN2	Dummy variable that takes a value of 1 for the second tranquil (post crisis) period, 0 otherwise.	+
DUMCRIS2	Dummy variable that takes a value of 1 for the second crisis period (2007-2008), 0 otherwise.	-

Table 2 presents the summary of statistics of the dependent and the explanatory variables.

Table 2. Summary of statistics of the dependent and explanatory variables

	ROA	LNTA	LOANS/ TA	LLP/ TL	NII/ TA	NIE/ TA	LNDEPO	EQASS	LNGDP	INFL	CR3	MKTCAP/ GDP
Mean	0.201	12.879	25.437	1.194	0.754	1.456	12.476	2.498	13.328	3.741	0.389	0.490
Min	-8.530	4.780	0.197	-0.108	-0.610	0.009	4.545	-12.950	12.967	1.400	0.243	0.180
Max	10.970	19.047	93.454	21.110	18.870	17.990	18.724	27.940	13.968	6.600	0.533	1.071
Std. Dev.	1.272	3.628	30.770	2.819	1.996	2.391	3.564	3.705	0.264	1.424	0.102	0.226

Note: The table presents the summary statistics of the variables used in the regression analysis.

Econometric specification

To test the relationship between bank profitability and the bank-specific and macroeconomic determinants described earlier, we estimate a linear regression model in the following form:

$$Y_{jt} = \delta_t + \alpha'_{jt} X_{ijt} + \alpha'_{it} X_{et} + \varepsilon_{jt} \quad (1)$$

where j refers to an individual bank; t refers to year; Y_{jt} refers to the ROA and is the observation of bank j in a particular year t; X_i represents the internal factors (determinants) of a bank; X_e represents the external factors (determinants) of a bank; ε_{jt} is a normally distributed disturbance term. We apply the least square method of the fixed effects (FE) model, where the standard errors are calculated by using White's (1980) transformation to control for cross section heteroscedasticity. The fixed effects model was used instead of a random effects model based on the results of the Hausman test.[9]

Extending equation (1) to reflect the variables as described in table 1, the baseline model is formulated as follows:

$$\text{ROA}_{jt} = \delta_0 + \alpha_1 \text{LNTA}_{jt} + \alpha_2 \text{LOANS/TA}_{jt} + \alpha_3 \text{LLP/TL}_{jt} + \alpha_4 \text{NII/TA}_{jt} + \alpha_5 \text{NIE/TA}_{jt} + \alpha_6 \text{LNDEPO}_{jt} + \alpha_7 \text{EQASS}_{jt}$$

[9] The Hausman test determines whether using random effects would be consistent and efficient. In essence, if the Hausman test statistic is large, the use of the fixed effects over the random effects regression model would be more efficient. On the other hand, if the statistic is small, the random effects regression model should be used.

$$+ \beta_1 \text{LNGDP}_t + \beta_2 \text{INFL}_t + \beta_3 \text{CR3}_t + \beta_4 \text{MKTCAP}_t$$
$$+ \beta_5 \text{DUMTRAN1} + \beta_6 \text{DUMCRIS} + \beta_7 \text{DUMTRAN2} + \beta_8 \text{DUMCRIS2}$$
$$+ \varepsilon_{jt} \quad (2)$$

Table 3 provides information on the degree of correlation between the explanatory variables used in the multivariate regression analysis. The matrix shows that in most cases the correlation between the bank-specific variables is not strong, suggesting that multicollinearity problems are not severe or non-existent. Kennedy (2008) points out that multicollinearity is a problem when the correlation is above 0.80. However, it is worth noting that the correlations between LNDEPO and LNTA and LOANS/TA variables are relatively high. On a similar note, the correlation between LNGDP and CR3 is also high. To address this concern, we have removed the LNDEPO and CR3 variables from the regression models and repeated equation 2. The empirical findings do not qualitatively change the results. Therefore, we have not reported the regression results in the report. The results, however, are available upon request.

IV. EMPIRICAL FINDINGS

It is in the public interest to know what banks can do to improve their profitability so that scarce resources are allocated to their best uses and not wasted during the production of services and goods (Isik and Hassan, 2003). For this purpose, we investigate whether any aspects of the banks are related to the banks' degree of profitability. In the analysis we discuss the performance of the banking sector of the Republic of Korea based on the results derived from a series of parametric and non-parametric tests. Afterwards, we discuss the results derived from a multivariate regression setting.

The performance of the banking sector of the Republic of Korea: A univariate setting

To examine the difference in the relative performance of the banking sector of the Republic of Korea, during the first and second tranquil periods, we have performed a series of parametric (*t*-test) and non-parametric (Mann-Whitney [Wilcoxon] and Kruskall-Wallis) tests. The results are presented in table 4, which show that on average the banking sector has been relatively more profitable during the first tranquil period of 1994-1996 compared to the second tranquil period of 1999-2008. The findings suggest that the banking sector had been relatively larger and disbursed a lower amount of loans (16.115 < 28.000) during the second tranquil

Table 3. Correlation matrix for the explanatory variables

Independent Variables	LNTA	LOANS/TA	LLP/TL	NII/TA	NIE/TA	LNDEPO	EQASS	LNGDP	INFL	CR3	MKTCAP
LNTA	1.000	-0.815**	-0.512**	-0.416**	-0.658**	0.995**	-0.711**	-0.447**	0.159**	-0.291**	-0.412**
LOANS/TA		1.000	0.434**	0.347**	0.626**	-0.815**	0.742**	0.671**	-0.248**	0.436**	0.593**
LLP/TL			1.000	0.574**	0.665**	-0.510**	0.385**	0.143**	-0.025	0.054	0.165**
NII/TA				1.000	0.824**	-0.423**	0.356**	0.027	0.037	-0.036	0.020
NIE/TA					1.000	-0.661**	0.473**	0.195**	-0.011	0.069	0.161**
LNDEPO						1.000	-0.720**	-0.430**	0.137**	-0.264**	-0.398**
EQASS							1.000	0.521**	-0.188**	0.324**	0.506**
LNGDP								1.000	-0.504**	0.843**	0.747**
INFL									1.000	-0.704**	-0.755**
CR3										1.000	0.674**
MKTCAP											1.000

Notes: The table presents the results from Spearman ρ correlation coefficients. The notation used in the table below is defined as follows: LLP/TL is a measure of bank risk calculated as the ratio of total loan loss provisions divided by total loans; NII/TA is a measure of bank diversification towards non-interest income, calculated as total non-interest income divided by total assets; NIE/TA is a proxy measure for management quality, calculated as personnel expenses divided by total assets; LOANS/TA is used as a proxy measure of loans intensity, calculated as total loans divided by total assets; LNTA is a proxy measure of size, calculated as a natural logarithm of total bank assets; LNDEPO is a proxy measure of network embeddedness, calculated as the log of total deposits; EQASS is a measure of capitalization, calculated as book value of shareholders equity as a fraction of total assets; LNGDP is natural log of gross domestic products; INFL is the rate of inflation; CR3 is the three bank concentration ratio; MKTCAP is the ratio of stock market capitalization divided by GDP.

** and * indicates significance at 1% and 5% levels respectively.

period (statistically significant at the 1 per cent level under both the parametric *t*-test and non-parametric Mann-Whitney [Wilcoxon] and Kruskall-Wallis tests).[10]

Table 4 indicates that credit risk of banks of the Republic of Korea has been lower during the first tranquil period (1.132 < 1.417) and is statistically significant at the 1 per cent level under the non-parametric Mann-Whitney [Wilcoxon] and Kruskall-Wallis tests. We also find that Korean banks have derived a higher proportion of income from non-interest sources during the second tranquil period (0.790 > 0.744), but this result is not statistically significant at any conventional levels under both the parametric *t*-test and non-parametric Mann-Whitney [Wilcoxon] and Kruskall-Wallis tests.

It is also apparent that the banking sector of the Republic of Korea incurs lower overhead expenses (1.368 < 1.481), but has better network embeddedness (12.892 > 12.362) during the second tranquil period. Of note, the banking sector seems to be relatively better capitalized during the first tranquil period, but is not statistically significant at any conventional levels under both the parametric *t*-test or the non-parametric Mann-Whitney [Wilcoxon] and Kruskall-Wallis tests.

Table 4. Summary of parametric and non-parametric tests

Individual tests	Test groups				
	Parametric test t-test		Non-parametric Test Mann-Whitney [Wilcoxon Rank-Sum] test		Kruskall-Wallis Equality of Populations test
Test satistics	*t* (Prb > *t*)		*z* (Prb > *z*)		χ^2 (Prb > χ^2)
	Mean	*t*	*Mean rank*	*z*	
ROA					
Pre-crisis	0.22332		195.51		
Post-crisis	0.12205	0.650	204.73	-0.661	0.437
LNTA					
Pre-crisis	12.71818		193.51		
Post-crisis	13.46369	-1.682*	212.00	-1.326	1.757

[10] The Mann-Whitney test determines whether two groups differ from each other based on ranked scores, while the Kruskall-Wallis test determines whether the distribution of the two groups is the same by comparing the sum of ranks in the groups.

Table 4. ***(continued)***

Individual tests	Test groups				
	Parametric test t-test		Non-parametric Test Mann-Whitney [Wilcoxon Rank-Sum] test		Kruskall-Wallis Equality of Populations test
Test satistics	*t* (Prb > *t*) *Mean*	*t*	*z* (Prb > *z*) *Mean rank*	*z*	χ^2 (Prb > χ^2)
LOANS/TA					
Pre-crisis	28.00109		213.58		
Post-crisis	16.11527	3.190***	139.06	-5.342***	28.542***
LLP/TL					
Pre-crisis	1.13160		196.54		
Post-crisis	1.41721	-0.787	140.52	-4.104***	16.844***
NII/TA					
Pre-crisis	0.74393		194.60		
Post-crisis	0.79013	-0.189	208.05	-0.965	0.931
NIE/TA					
Pre-crisis	1.48060		195.02		
Post-crisis	1.36846	0.383	206.52	-0.825	0.680
LNDEPO					
Pre-crisis	12.36165		194.69		
Post-crisis	12.89214	-1.216	207.70	-0.932	0.869
EQASS					
Pre-crisis	2.60559		196.50		
Post-crisis	2.10715	1.099	201.12	-0.331	0.109

Note: Test methodology follows, among others, Aly and others (1990), Elyasiani and Mehdian (1992), and Isik and Hassan (2002). Parametric (*t*-test) and non-parametric (Mann-Whitney and Kruskall-Wallis) tests determine the null hypothesis of equal mean between the two models.

***, **, * indicates significance at the 1%, 5%, and 10% levels respectively.

Determinants of bank profitability: a multivariate analysis

The regression results that focus on the relationship between bank profitability and the explanatory variables are presented in table 5. To conserve space, the full regression results, which include both bank and time specific fixed effects, are not reported in the paper. However, several general comments regarding the test results are warranted. The model performs reasonably well with most variables remaining stable across the various regressions tested. The explanatory power of the models is also reasonably high, while the *F*-statistics for all models is significant at the 1 per cent level.

Table 5. Panel fixed effects regression results

	(1)	(2)	(3)	(4)	(5)	(6)
CONSTANT	-0.2045 (-0.1253)	10.6667** (2.4638)	9.4260* (1.8233)	10.9710** (2.4152)	10.452*** (2.6452)	7.9355* (1.6767)
Bank characteristics						
LNTA	-0.1241 (-0.4550)	-0.1891 (-0.6488)	-0.1963 (-0.6814)	-0.1746 (-0.5931)	-0.1560 (-0.5062)	-0.1315 (-0.4064)
LOANS/TA	-0.0068 (-0.7952)	-0.0019 (-0.2347)	-0.0018 (-0.2179)	-0.0009 (-0.1113)	-0.0014 (-0.1766)	-0.0021 (-0.2612)
LLP/TL	-0.2900** (-2.0239)	-0.2889** (-2.0145)	-0.2868** (-1.9992)	-0.2888** (-2.01610)	-0.2908** (-2.0046)	-0.2912** (-2.0022)
NII/TA	-0.0723 (-0.2468)	-0.0601 (-0.2060)	-0.0590 (-0.2027)	-0.0588 (-0.2013)	-0.0581 (-0.1985)	-0.0550 (-0.1891)
NIE/TA	0.0840 (0.3147)	0.0818 (0.3075)	0.0809 (0.3049)	0.0806 (0.3030)	0.0816 (0.3059)	0.0819 (0.3073)
LNDEPO	0.1375 (0.6600)	0.2264 (0.9234)	0.2364 (0.9864)	0.2165 (0.8724)	0.1954 (0.7441)	0.1705 (0.6196)
EQASS	0.3176*** (2.8281)	0.3204*** (2.8768)	0.3180*** (2.8607)	0.3188*** (2.8462)	0.3199*** (2.8532)	0.3183*** (2.8540)
Economic and market conditions						
LNGDP		-0.9276*** (-2.8250)	-0.8367** (-2.1751)	-0.9551*** (-2.7771)	-0.9193*** (-3.0298)	-0.7271** (-2.1489)
INFL		0.0901*** (2.9329)	0.0788** (2.2774)	0.0958*** (2.6848)	0.1023*** (3.1168)	0.0985*** (3.1688)

Table 5. ***(continued)***

	(1)	(2)	(3)	(4)	(5)	(6)
CR3		1.4641**	1.6143**	1.5027**	1.3957**	1.4202**
		(2.0107)	(2.3072)	(2.2746)	(1.9491)	(2.0018)
MKTCAP/GDP		0.3657	0.2764	0.2801	0.3769	0.4167*
		(1.5364)	(1.0414)	(1.0024)	(1.5989)	(1.7710)
DUMTRAN1			0.1153			
			(1.1923)			
DUMCRIS				-0.0958		
				(-1.2659)		
DUMTRAN2					0.0587	
					(0.7215)	
DUMCRIS2						-0.1647
						(-1.3198)
R^2	0.6655	0.6727	0.6736	0.6734	0.6730	0.6736
Adjusted R^2	0.6117	0.6151	0.6150	0.6148	0.6143	0.6150
Durbin-Watson stat	1.8959	1.9389	1.9357	1.9408	1.9495	1.9576
F-statistic	12.3656***	11.6943***	11.4973***	11.4868***	11.4644***	11.4967***
No. of observations	369	369	369	369	369	369

Notes: $ROE_{jt} = \delta_0 + \alpha_1 LNTA_{jt} + \alpha_2 LOANS/TA_{jt} + \alpha_3 LLP/TL_{jt} + \alpha_4 NII/TA_{jt} + \alpha_5 NIE/TA_{jt} + \alpha_6 LNDEPO_{jt} + \alpha_7 EQASS_{jt} + \beta_1 LNGDP + \beta_2 INFL + \beta_3 CR3 + \beta_4 MKTCAP + \beta_5 DUMTRAN1 + \beta_6 DUMCRIS + \beta_7 DUMTRAN2 + \beta_8 DUMCRIS2 + \varepsilon_{jt}$

The dependent variable is ROE calculated as net profit divided by total shareholders' equity; LNTA is a proxy measure of size, calculated as a natural logarithm of total bank assets; LOANS/TA is used as a proxy measure of loans intensity, calculated as total loans divided by total assets; LLP/TL is a measure of bank credit risk calculated as the ratio of total loan loss provisions divided by total loans; NII/TA is a measure of bank diversification towards non-interest income, calculated as total non-interest income divided by total assets; NIE/TA is a proxy measure for management quality, calculated as personnel expenses divided by total assets; LNDEPO is a proxy measure of network embeddedness, calculated as the log of total deposits; EQASS is a measure of capitalization, calculated as book value of shareholders' equity as a fraction of total assets; LNGDP is natural log of gross domestic products; INFL is the rate of inflation; CR3 is the three bank concentration ratio; MKTCAP is the ratio of stock market capitalization divided by GDP; DUMTRAN1 is a dummy variable that takes a value of 1 for the first tranquil (pre crisis) period, 0 otherwise; DUMCRIS is a dummy variable that takes a value of 1 for the first crisis period, (1997-1998) 0 otherwise; DUMTRAN2 is a dummy variable that takes a value of 1 for the second tranquil (post crisis) period, 0 otherwise; DUMCRIS2 is a dummy variable that takes a value of 1 for the second crisis period (i.e. 2007-2008), 0 otherwise. Values in parentheses are *t*-statistics. ***, **, and * indicates significance at 1%, 5%, and 10% levels respectively.

The relationship between size (LNTA) and the profitability of banks of the Republic of Korea is negative in the baseline regression model as well as when the macroeconomic and market variables are controlled. Hauner (2005) offers two potential explanations for the positive impact size has on bank performance. First, if it relates to market power, large banks should pay less for their inputs. Second, there may be increasing returns to scale through the allocation of fixed costs, (e.g. research or risk management) over a higher volume of services or from efficiency gains from a specialized workforce. However, the coefficient is not statistically significant at any conventional levels in all the regression models estimated.

Referring to the impact of bank liquidity, LOANS/TA is negatively related to the profitability of a bank, indicating a positive relationship between bank profitability and the level of liquid assets held by the bank. As higher figures of the ratio denote lower liquidity, the results imply that more (less) liquid banks tend to exhibit higher (lower) profitability levels. A plausible reason for this is the increased cost for screening and monitoring required by a higher proportion of loans in the financial institutions' assets portfolio since loans are the type of assets with the highest operational cost in a bank portfolio (Ben Naceur and Omran, 2008). Furthermore, it can also be argued that some banks operating in the Republic of Korea may have other policy objectives, which are not necessarily profit-oriented. For example, they could be lending to related parties to meet these objectives, which puts a strain on their resources, limiting their involvement in other revenue enhancing activities.[11]

As expected, the impact of credit risk (LLP/TL) has a negative relationship with bank profitability and is statistically significant at the 1 per cent level in all regression models, suggesting that banks with higher credit risk exhibit lower profitability levels. Table 5 indicates that the intensity of LLP/TL towards profitability of banks operating in the Republic of Korea is relatively high. The results imply that the banks should focus more on credit risk management, which has been proven to be problematic. Serious banking problems have arisen from the failure of financial institutions to recognize impaired assets and create reserves for writing off these assets. An immense help towards smoothing these anomalies could be provided by improving the transparency of the banking sector, which, in turn, would enable banks to evaluate credit risk more effectively and avoid problems associated with hazardous exposure.

[11] These developments could have been argued to have taken place particularly before the Asian financial crisis in 1997-1998. Since the Asian financial crisis struck, banks in the Republic of Korea seem to have been acting on the basis of profitability.

The coefficient of NII/TA is negative under controlled and uncontrolled macroeconomic and market conditions. The results imply that banks which derive a higher proportion of income from non-interest sources such as derivative and stock market trading and other fee-based services tend to report lower profitability levels. The empirical findings are consistent with a study by Stiroh (2004), which suggests that greater reliance on non-interest income, particularly trading revenue, is associated with lower risk-adjusted profits and higher risk. On a similar note, Stiroh and Rumble (2006) find that the benefits holding companies in the United States of America derive from diversification are offset by the increased exposure to non-interest-generating activities, which are much more volatile but not necessarily more profitable than interest-generating activities.

Concerning the impact of overhead costs, NIE/TA exhibits a positive impact on bank profitability. The results imply that an increase (decrease) in these expenses increases (reduces) the profits of banks operating in the Republic of Korea. Interestingly, the empirical findings seem to suggest that expense preference behaviour measured by NIE/TA consistently exhibits positive impacts on bank profitability levels. A plausible explanation for this is that highly qualified and professional management may require higher remuneration packages and thus, a positive relationship with performance measure is natural (Sathye, 2003).

The impact of network embeddedness (LNDEPO) on bank profitability is positive, supporting findings by, Lim and Randhawa (2005) and Sufian (2007), among others, which have found that the large banks are relatively more managerially efficient. It could be argued that the large banks with extensive branch networks across a nation may have the advantage over smaller bank counterparts in attracting more deposits and loan transactions. This advantage enables them to command larger interest rate spreads and subsequently, obtain higher levels of profitability.

The level of capitalization (EQASS) is positively related to the profitability of banks in the Republic of Korea, and is statistically significant at the 1 per cent level or better in the regression models. This empirical finding is consistent with Berger (1995), Demirgüç-Kunt and Huizinga (1999), Staikouras and Wood (2003), Goddard and others (2004), Pasiouras and Kosmidou (2007), and Kosmidou (2008), supporting the argument that well capitalized banks are better able to attract customer deposits, the cheapest source of funds, based on confidence they will remain solvent. Furthermore, a strong capital structure is essential for banks in developing economies, since it provides additional strength to withstand financial crises, and increased safety for depositors during unstable macroeconomic conditions.

The results pertaining to the impact of GDP growth on ROA are negative, and are statistically significant at the 5 per cent level or better. Demand for financial services tends to grow as economies expand and societies become wealthier. However, the volatile economic growth during the period under study could has resulted in lower demand for financial services and increased loan defaults. On the other hand, the impact of inflation (INFL) is positively related to the profitability of banks in the Republic of Korea, implying that during the period under study the banks adequately anticipated the levels of inflation, enabling them to adjust interest rates accordingly and consequently, earn higher profits. The result is consistent with the findings by Pasiouras and Kosmidou (2007), among others.

Our findings show that the impact (CR3) is positive, and is statistically significant at the 5 per cent level in all regression models during the period under study. These results clearly support the Structure-Conduct-Performance (SCP) hypothesis, which states that banks in highly concentrated markets tend to collude, and therefore, earn monopoly profits (Short, 1979; Gilbert, 1984; Molyneux and others, 1996).

The impact of stock market capitalization (MKTCAP) on bank profitability is positive, implying that during the period under study, the stock market of the Republic of Korea was well developed and served as source of complimentary services instead of an alternative place for potential borrowers to obtain funds. However, of note, the coefficient of the variable becomes statistically significant when the recent global financial crisis period (DUMCRIS2) is controlled. The findings, nevertheless, need to be interpreted with caution since the coefficient of the variable is only statistically significant at the 10 per cent level.

As expected, the empirical findings seem to suggest that the banking sector of the Republic of Korea has been relatively more profitable during both the tranquil periods, namely in the years 1994-1996 and 1999-2006, compared to the two crisis periods, the Asian financial crisis (1997-1998) and the recent global financial crisis (2007-2008). However, the results must be interpreted with caution since all the variables are not statistically at any conventional levels.

Robustness checks

In order to check for the robustness of the results, a number of sensitivity analyses have been carried out. In the first analysis, LNGDP with ΔGDP (change in real gross domestic products) are replaced. The results, presented in table 6, indicate that when the LNGDP variable is replaced with the ΔGDP variable, the coefficients of the baseline variables stay mostly the same as they keep the same sign and same order of magnitude, and also remain significant to the same degree as found

in the baseline regression models (albeit sometimes at different levels). Also, with few exceptions, the results do not become significant if they were in the baseline regression models.

Table 6. Panel fixed effects regression results

	(1)	(2)	(3)	(4)	(5)
CONSTANT	-0.4088	-0.6183	-0.3183	-0.5317	-1.0269
	(-0.2442)	(-0.3610)	(-0.1885)	(-0.3225)	(-0.5970)
Bank characteristics					
LNTA	-0.1808	-0.1980	-0.1777	-0.1363	-0.0787
	(-0.6070)	(-0.6818)	(-0.6009)	(-0.4483)	(-0.2447)
LOANS/TA	-0.0067	-0.0059	-0.0060	-0.0062	-0.0052
	(-0.7333)	(-0.6505)	(-0.6592)	(-0.6936)	(-0.6078)
LLP/TL	-0.2868***	-0.2837**	-0.2858**	-0.2895**	-0.2920**
	(-1.9930)	(-1.9783)	(-1.9859)	(-1.9864)	(-1.9921)
NII/TA	-0.0700	-0.0664	-0.0673	-0.0658	-0.0569
	(-0.2390)	(-0.2285)	(-0.2297)	(-0.2238)	(-0.1950)
NIE/TA	0.0821	0.0808	0.0810	0.0820	0.0822
	(0.3068)	(0.3039)	(0.3029)	(0.3058)	(0.3071)
LNDEPO	0.1967	0.2214	0.1988	0.1554	0.1062
	(0.8150)	(0.9588)	(0.8414)	(0.6171)	(0.3978)
EQASS	0.3183***	0.3149***	0.3160***	0.3176***	0.3153***
	(2.8577)	(2.8498)	(2.8254)	(2.8279)	(2.8135)
Economic and market conditions					
ΔGDP	-0.0010	-0.0032	-0.0104	-0.0059	-0.0002
	(-0.1187)	(-0.3806)	(-1.1523)	(-0.5329)	(-0.0419)
INFL	0.0405**	0.0301	0.0456**	0.0608**	0.0752***
	(1.9289)	(1.4936)	(2.1279)	(2.3102)	(2.8653)
CR3	-0.0204	0.3652	-0.3154	-0.2615	0.4928
	(-0.0254)	(0.4145)	(-0.4314)	(-0.2822)	(0.7329)
MKTCAP/GDP	0.1043	0.0413	0.1048	0.2003	0.2942
	(0.3097)	(0.1156)	(0.2958)	(0.5193)	(0.8758)
DUMTRAN1		0.1789**			
		(2.3859)			
DUMCRIS			-0.1441*		
			(-1.7469)		
DUMTRAN2				0.0970	
				(0.8009)	

Table 6. ***(continued)***

	(1)	(2)	(3)	(4)	(5)
DUMCRIS2					-0.2991**
					(-2.0648)
R^2	0.6670	0.6693	0.6679	0.6676	0.6709
Adjusted R^2	0.6084	0.6099	0.6083	0.6079	0.6118
Durbin-Watson stat	1.4762	1.4765	1.4837	1.5004	1.5317
F-statistic	11.3969***	11.2754***	11.2038***	11.1888***	11.3558***
No. of Observations	369	369	369	369	369

Notes: $ROE_{jt} = \delta_0 + \alpha_1 LNTA_{jt} + \alpha_2 LOANS/TA_{jt} + \alpha_3 LLP/TL_{jt} + \alpha_4 NII/TA_{jt} + \alpha_5 NIE/TA_{jt} + \alpha_6 LNDEPO_{jt} + \alpha_7 EQASS_{jt} + \beta_1 \Delta GDP + \beta_2 INFL + \beta_3 CR3 + \beta_4 MKTCAP + \beta_5 DUMTRAN1 + \beta_6 DUMCRIS + \beta_7 DUMTRAN2 + \beta_8 DUMCRIS2 + \varepsilon_{jt}$

The dependent variable is ROE calculated as net profit divided by total shareholders equity; LNTA is a proxy measure of size, calculated as a natural logarithm of total bank assets; LOANS/TA is used as a proxy measure of loans intensity, calculated as total loans divided by total assets; LLP/TL is a measure of bank credit risk calculated as the ratio of total loan loss provisions divided by total loans; NII/TA is a measure of bank diversification towards non-interest income, calculated as total non-interest income divided by total assets; NIE/TA is a proxy measure for management quality, calculated as personnel expenses divided by total assets; LNDEPO is a proxy measure of network embeddedness, calculated as the log of total deposits; EQASS is a measure of capitalization, calculated as book value of shareholders' equity as a fraction of total assets; ΔGDP is change in the real gross domestic products; INFL is the rate of inflation; CR3 is the three bank concentration ratio; MKTCAP is the ratio of stock market capitalization divided by GDP; DUMTRAN1 is a dummy variable that takes a value of 1 for the first tranquil (pre crisis) period, 0 otherwise; DUMCRIS is a dummy variable that takes a value of 1 for the first crisis period (i.e. 1997-1998), 0 otherwise; DUMTRAN2 is a dummy variable that takes a value of 1 for the second tranquil (post crisis) period, 0 otherwise; DUMCRIS2 is a dummy variable that takes a value of 1 for the second crisis period (i.e. 2007-2008), 0 otherwise. Values in parentheses are *t*-statistics. ***, **, and * indicates significance at 1%, 5%, and 10% levels respectively.

Table 6 indicates that the ΔGDP variable entered all the regression models with a negative sign, but is never statistically significant at any conventional levels. On a similar note, the empirical findings suggest that the coefficient of the CR3 variable loses its explanatory power when we replace the LNGDP variable with the ΔGDP variable. On the other hand, the results clearly indicate that the banking sector of the Republic of Korea has been relatively more profitable during the first tranquil period (DUMTRAN1) and is statistically significant at the 5 per cent level. The empirical findings also clearly indicate that the banking sector has been negatively affected by both the Asian financial crisis (DUMCRIS1) and the most recent global financial crisis (DUMCRIS2).

Secondly, we restrict out sample to the banks which have more than three years of observations. All in all, the results remain qualitatively similar in terms of directions and significance levels. Thirdly, we address the effects of outliers by removing the top and bottom 1 per cent of the sample. The results remain robust in terms of directions and significance levels. Finally, we replace ROA with ROE (return on equity) and repeat equation 2. In general, the results confirm the baseline regression results. To conserve space, the full regression results are not reported, but are available upon request.

V. CONCLUDING REMARKS AND DIRECTIONS FOR FUTURE RESEARCH

The Asian financial crisis has had a profound negative impact on the banking sector of the Republic of Korea, with the sharp decline in the domestic currency causing extensive damage to the balance sheets of leading banks. Meanwhile, at the same time, banks were hit a sharp drop in revenues as higher rates could not be passed on to distressed corporate borrowers. The banks, consequently, were functioning in an environment of negative interest rate spreads, which cut into their net income and lowered their capital adequacy ratios.

By using an unbalanced bank level panel data, this study seeks to examine the determinants of the profitability of banks of the Republic of Korea during the period 1994-2008. The empirical findings suggest that the banks with lower credit risk tend to exhibit higher profitability levels, while the level of capitalization shows a positive effect during both the crises and tranquil periods. The effects of a business cycle on banks' profitability are mixed. On the one hand, inflation displays a substantial pro-cyclical impact, while GDP has a counter-cyclical influence on the banks' profitability. We find that the industry concentration of the national banking system has a positive as well as significant effect on the profitability of the banks. The effects of both the Asian financial crisis and the recent global financial crisis are negative, while the banks have been relatively more profitable during both the tranquil periods.

Future research could include more variables such as taxation and regulation indicators, exchange rates as well as indicators of the quality of the offered services. Another possible extension could be the examination of differences in the determinants of profitability between small and large or high and low profitability banks. In terms of methodology, a statistical cost accounting and frontier techniques could also be used.

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